groups to the total hydroxyl functional groups of the polyol component and the chain extender is from about 0.98 to about 1.03.

39. The process for preparing a thermoplastic polyurethane composition according to claim 38, wherein said polyol component has a hydroxyl functionality of from about 1.95 to about 2.05.

The following is a marked-up version of the prior pending claims with all changes shown in conventional comparison:

IN THE CLAIMS:

1. (Amended) A thermoplastic polyurethane comprising the reaction product of:

a polyol component including a randomly polymerized polyether polyol having at least 75 percent by weight of propylene oxide repeat units and having a high secondary hydroxyl group content of about [20] 51 to about 100 percent based on the total number of hydroxyl group present in said high secondary polyether polyols;

a polyisocyanate;

a chain extender; and

[optionally,] a polyurethane catalyst[.],

and wherein said thermoplastic polyurethane has a molecular weight of from about 75,000 to about 400,000 weight average.

Cancel claim 2.

3. (Amended) The thermoplastic polyurethane according to claim [2] 1, wherein said polyol component has a number average molecular weight of from about 600 to about 5,000, and wherein said polyol component has a hydroxyl functionality of from about 1.8 to about 2.2.

Cancel claim 7.

8. (Amended) The thermoplastic polyurethane according to claim 3, wherein said thermoplastic polyurethane has a molecular weight from about 125,000 to about 300,000, wherein said high secondary polyether polyol has a secondary hydroxyl group content of about [40] 65 to about [70] 90%, and wherein the mole ratio of polyisocyanate functional groups to hydroxyl functional groups of the polyol component and the chain extender is from about 0.98 to about 1.03.

9. (Amended) The thermoplastic polyurethane according to claim [2] 1, [wherein said high secondary polyether polyol has a secondary hydroxyl group content of about 51 to about 100 percent, wherein said high secondary polyether polyol is a propylene oxide copolymer having at least 60% by weight of propylene oxide repeat units, and] wherein said polyol component has hydroxyl functionality of from about 1.95 to about 2.05.

10. (Amended) The thermoplastic polyurethane according to claim [7] 1, wherein said polyol component includes less than or equal to 15 weight percent of said polyol having low secondary hydroxyl group content, and wherein said polyurethane catalyst is present in an amount from about 20 to about 500 parts by weight per million parts by weight of the total weight of said polyisocyanate, said polyol component, and said chain extender.

11. (Amended) The thermoplastic polyurethane according to claim [7] 1, wherein said thermoplastic polyurethane has a molecular weight from about 150,000 to about 250,000.

Cancel claims 14 and 15.

16. (Amended) A polyurethane composition, comprising:

a polyol component including a randomly polymerized polyether polyol having at least 75 percent by weight of propylene oxide repeat units and having a high secondary hydroxyl group content of about [20] 51 to about 100 percent based on the total number of hydroxyl groups present in said high secondary polyether polyol,

a polyisocyanate;

a chain extender; and

[optionally,] a polyurethane catalyst,

said polyurethane being a thermoplastic substantially free of cross-links[.],

and wherein said thermoplastic polyurethane has a molecular weight of from about 75,000 to about 400,000 weight average.

Cancel claim 17.

18. (Amended) The polyurethane composition according to claim [17] 16, wherein said polyol component has a number average molecular weight of from about 600 to about 5,000, and wherein said polyol component has hydroxyl functionality of from about 1.8 to about 2.2.

Cancel claim 22.

23. (Amended) The polyurethane composition according to claim 18, wherein said thermoplastic polyurethane has a molecular weight from about 125,000 to about 300,000, wherein said high secondary polyether polyol has a secondary hydroxyl group content of about [40] 65 to about [70] 90%, and wherein the mole ratio of polyisocyanate functional groups to the total hydroxyl functional groups of the polyol component and the chain extender is from about 0.98 to about 1.03.

24. (Amended) The polyurethane composition according to claim [17] 16, [wherein said high secondary polyether polyol has a secondary hydroxyl group content of about 51 to about 100 percent, wherein said high secondary polyether polyol is a propylene oxide copolymer having at least 60% by weight of propylene oxide repeat units, and] wherein said polyol component has a hydroxyl functionality of from about 1.95 to about 2.05.

25. (Amended) The polyurethane composition according to claim [22] 16, wherein said polyol component includes less than or equal to 15 weight percent of said polyol having low

secondary hydroxyl group content, and wherein said polyurethane catalyst is present in an amount from about 20 to about 500 parts by weight per million parts by weight of the total weight of said polyisocyanate, said polyol component, and said chain extender.

26. (Amended) The polyurethane composition according to claim [22] 16, wherein said thermoplastic polyurethane has a molecular weight from about 150,000 to about 250,000.

Cancel claims 29 and 30.

31. (Amended) A process for preparing a thermoplastic polyurethane composition, comprising:

reacting in substantially a single step a composition comprising:

[a)] a polyol component including a randomly polymerized polyether polyol having at least 75 percent by weight of propylene oxide repeat units and having a high secondary hydroxyl group content of about [20] 51 to about 100 percent based on the total number of hydroxyl group present in said polyether polyol;

a polyisocyanate;

a chain extender; and

[optionally,] a polyurethane catalyst[.],

wherein said thermoplastic polyurethane is substantially linear, and wherein said thermoplastic polyurethane has a molecular weight of from about 75,000 to about 400,000 weight average.

Cancel claim 32.

33. (Amended) The process for preparing a thermoplastic polyurethane composition according to claim [32] 31, wherein said polyol component has a number average molecular weight of from about 600 to about 5,000, and wherein said polyol component has hydroxyl functionality of from about 1.8 to about 2.2.

Cancel claim 37.

38. (Amended) The process for preparing a thermoplastic polyurethane composition according to claim [37] 33, wherein said thermoplastic polyurethane has a molecular weight from about 125,000 to about 300,000, wherein said high secondary polyether polyol has a secondary hydroxyl group content of about [40] 65 to about [70] 90%, and wherein the mole ratio of polyisocyanate functional groups to the total hydroxyl functional groups of the polyol component and the chain extender is from about 0.98 to about 1.03.

39. (Amended) The process for preparing a thermoplastic polyurethane composition according to claim 38, [wherein said high secondary polyether polyol has a secondary hydroxyl group content of about 51 to about 100 percent, wherein said high secondary polyether polyol is a propylene oxide copolymer having at least 60% by weight of propylene oxide repeat units, and] wherein said polyol component has a hydroxyl functionality of from about 1.95 to about 2.05.

Cancel claims 44 and 45.

REMARKS

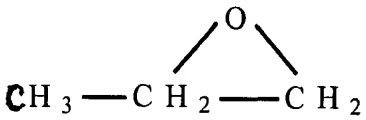
Claims 1-45 were rejected under 35 U.S.C. §103(a) as being obvious over Smith in view of Yoda. Claims 44 and 45 were objected to as being improper under 37 CFR 1.75(c).

Claims 44 and 45 have been cancelled as the Examiner is correct in that claims 44 and 45 were in improper dependent form.

The rejection under 35 U.S.C. §103(a) is respectfully traversed.

The independent claims 1, 16, and 31 have been amended to recite that the thermoplastic polyurethane is a high molecular weight (75,000 - 400,000) polymer, that the polyol has at least 75 percent by weight of propylene oxide repeat units and has from 51 to 100 percent secondary hydroxyl group content. The dependent claims were amended to either cancel the claims where the feature is now recited in the independent claims or to amend them in light of the changes to the independent claims.

Applicant's amended claims requires that the polyol has 75 percent by weight propylene units and 51 percent or greater of secondary hydroxyl groups. It should be noted that the level of propylene oxide used in the polyol is not directly proportional to the amount of secondary hydroxyl content. In Smith, Example I, column 6, lines 50-53, a 9 percent ethylene oxide content gave a 70% primary hydroxyl. Propylene oxide has the formula:



whether the propylene oxide forms a primary hydroxyl or a secondary hydroxyl depends upon which of the bonds connecting the oxygen and carbon atoms break during polymerization. If the bond connecting the end carbon and oxygen breaks, a secondary hydroxyl group is formed. If the bond connecting the center carbon and oxygen breaks, a primary hydroxyl is formed. The ethylene oxide gives all primary hydroxyl and no secondary hydroxyl.

Although beyond the scope of the present invention, it is believed that the catalyst used and the reaction conditions for the EO and PO reaction determine how much of the PO forms secondary hydroxyl groups. Applicant did not produce the polyol but rather used a commercially available polyol (Arcol-2835) having high secondary hydroxyl content for the Examples of this application.

In Smith, the polyol was prepared (see Example I, column 6, lines 29-55) using a double metal cyanide catalyst from a polyoxypropylene diol reacted with propylene oxide. The ethylene oxide was then reacted using KOH catalyst. By using the KOH, Smith had to neutralize the base and remove the metal impurities. This step can be avoided with the polyol used by Applicant as stated on page 4, line 24 to page 5, line 5 of Applicant's specification.

Applicant's amended claim recite a randomly polymerized polyol. Smith first polymerized the propylene oxide component and then using that polymer and a second catalyst (KOH) reacted ethylene oxide onto the propylene oxide polymer. Smith did not use a randomly polymerized polyol as required by the amended claims. Smith reacted the ethylene oxide onto

the first polymer (propylene oxide) made in order to get rid of the unreactive end groups formed on the first polymer.

The reference Yoda et al. teaches a segmented polyurethane polymer having a hydrophobic segment and a hydrophilic segment. The polyurethanes made by Yoda et al. are very different from those of the present invention. Yoda et al. uses from 30 percent ethylene oxide in Example 1 to 70% in Examine 2 for only one component of a polyol mixture. The other polyol used by Yoda is hydroxy-terminated polytetramethylene ether (which has no secondary hydroxyl). Applicant's amended claims require a 75 percent propylene oxide, thus there can be a maximum of 25% ethylene oxide. Also, the polymers produced by Yoda et al. all have very low molecular weight, about 30,000 to 40,000 (see Yoda Examples 1-4). Applicant's amended claims require a molecular weight of from 75,000 to 400,000.

Applicant's amended claims now require a polyurethane catalyst to achieve the high molecular weight polyurethane. Secondary hydroxyl groups are not very reactive and with the high secondary content in the amended claims, it is necessary to have a polyurethane catalyst when reacting the polyol, chain extender, and polyisocyanate.

Now, what does one skilled in the art learn from Smith in view of Yoda et al. Yoda et al. teaches one to make a segmented polyurethane polymer with very low molecular weight. Smith does not randomly polymerize the propylene oxide with the ethylene oxide. Smith instead first polymerizes the propylene oxide with a polyoxypropylene diol and then proceeds to react, with a KOH catalyst, ethylene oxide onto the polymer formed in order to get rid of the unsaturated ends.

It is submitted that one skilled in the art would not be taught how to make a randomly polymerized ethylene oxide-propylene oxide polymer having high molecular weight and high secondary hydroxyl content from the combined teachings of Smith and Yoda et al.

Applicant's invention to achieve a thermoplastic polyurethane from a randomly polymerized polyol having high molecular weight, high secondary hydroxyl content, and is useful for applications such as house wrap and roofing membranes requiring high moisture vapor transmission rates, is not obvious from the combination of Smith and Yoda et al.

The Examiner is requested to reconsider the rejection under 35 U.S.C. §103(a) in view of the claim amendments made in this response. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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